

REMARKS

35 USC §132 Objections

The Amendment filed 10/12/04 has been objected to under 35 USC 132 because it introduces new matter into the disclosure. As support for this objection the Office Action states: "The added material which is not supported by the original disclosure is as follows: the first polymer member, the molded material and the filler configured to reduce thermo mechanical stresses in the package; and the second polymer member comprises a second filler, the polymer members are located on opposing sides of the die."

This objection is traversed. The specification describes the first member (molded inner member 42) at page 11, lines 16-20 as being configured such that "the lower portion 44A, and the upper portion 44B of the molded outer member 44 comprise substantially equal volumes of molding compound". The specification also states at page 11, lines 32-33: "The equal volumes of molding compound help to minimize thermo mechanical stresses during cooling of the molding compound".

In addition, the specification states at page 13, lines 15-20: "In addition, the molding compound used to form the inner member 42 can include fillers selected to provide the outer member with desired mechanical and electrical characteristics such as a relatively fast cure time, and an increased rigidity for strengthening the package body 18."

The specification thus describes the first member (molded inner member 42) as having a geometry selected to equalize the volumes of molding compound for the second member (molded outer member 44), and a filler which

strengthens the first member (molded inner member 42). Both of these features of the first member (i.e., the geometry and the composition of the molded inner member 42) reduce package bow, and reduce thermo-mechanical stresses in the package.

35 USC §112 Rejections Of Claims 57, 60, 64-65 and 78

Claims 57, 60, 64-65 and 78 have been rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement. These rejections are based on the above noted material in claims 57, 60, 64, 65, 75 and 78.

These rejections are traversed for essentially the reasons stated above in regard to the 35 USC §132 objections. However, rejected independent claims 57, 60, 64, 65, 75 and 78 have been amended to make the objectionable recitations clearer.

35 USC §112 Rejection Of Claim 74

Claim 74 has been rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement. In support of this rejection the Office Action states: "Fig. 5 discloses the plurality of polymer members 66 on the lead frame, wherein the polymer member is a tape. How can a tape (polymer member 66) comprises a filler?"

This rejection is traversed. Claim 74 does not specify that the members (volume equalizing members 66-Figure 5) comprise tape and a filler. As stated on page 15, lines 15-17 of the specification: "The volume equalizing members 66 can comprise molded members formed by a molding compound substantially as previously described

for inner member 42 (Figure 2E)." In addition, the specification states at page 13, lines 15-16: "the molding compound used to form the inner member can include fillers".

35 USC §103 Rejections

Claims 57-58, 61-70 and 78-82 have been rejected under 35 USC 103(a) as being unpatentable over Kennedy (US Patent No. 3,778,685 (previously applied) in view of Ishikawa et al. (US Patent 5,394,014) (previously applied).

Claims 71-73 and 76-77 have been rejected under 35 USC 103(a) as being unpatentable over Inaba (US Patent No 6,093,958) in view of Ueda et al. (US Patent No. 5,157,478 (newly cited).

These rejections are traversed. However, the claims have been amended to more clearly recite the features which are not disclosed or suggested by the prior art.

35 USC §103 Rejections Over Kennedy and Ishikawa et al.

Amended independent claim 57 recites "the first member and the second member having geometries selected to reduce thermo-mechanical stresses in the package". Antecedent basis for this recitation is contained on page 11, lines 16-20 of the specification, and on page 11, lines 32-33 of the specification.

Amended independent claim 57 also recites "the first compound and the second compound having at least one filler selected to provide desired mechanical and electrical characteristics in the package." Antecedent basis for this recitation is contained on page 13, lines 15-20 of the specification.

Kennedy and Ishikawa et al. do not disclose or suggest a semiconductor package having the above recited features. In Kennedy a rubbery potting compound 13 is formed around the chip 12, and a molded cover 14 is formed around the potting compound 13. However, neither the rubbery potting compound 13, or the molded cover 14, have geometries selected to minimize thermo mechanical stresses in the package. Rather, as stated at column 3, lines 16-19 of Kennedy: "This material (*rubbery potting compound 13*) insulates and protects the chip and bonded lead areas, and its compressibility allows for shrinkage of the outer plastic cover (*14*) without damage to the chip." (*italic material added*)

Kennedy thus teaches shrinkage of the outer plastic cover 14, which would increase, rather than reduce, thermo-mechanical stresses in the package. Kennedy in effect "teaches away" from first and second members configured to minimize thermo-mechanical stresses, as in the present package. A reference which "teaches away" cannot be used to support a prima facie case of obviousness. See for example, W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983).

Ishikawa et al. was cited as teaching a first polymer member 1 comprising a molded material and at least one filler. Admittedly, fillers have been used in the art in combination with a molding compound. However, the present package carries this concept one step further. Specifically, the present package includes multiple encapsulating members having a stress limiting geometry, and fillers which further reduce stress and improve package characteristics.

Amended independent claim 65 recites "a second member encapsulating the first member having substantially equal volumes of a molding compound on either side of the leadframe". In addition, claim 65 recites "the first member having a selected geometry for providing the substantially equal volumes and for reducing thermo-mechanical stresses during molding of the second polymer member." Antecedent basis for these recitations is contained on page 11, lines 16-20 and at page 11, lines 32-33 of the specification. As previously argued, in Kennedy the potting compound 13 and the cover 14 are not configured to achieve volume equalization and thermo-mechanical stress reduction.

Amended independent claim 78 recites "the first member and the second member having a geometry selected to reduce thermo-mechanical stresses in the package and to provide a package bow measured from a theoretical flat profile FP of less than about 3 mils." Antecedent basis for the flat profile recitation is contained on page 14, lines 17-19 of the specification. As previously argued, in Kennedy the potting compound 13 and the cover 14 are not configured to achieve thermo-mechanical stress reduction and the stated flat profile.

In view of these differences not taught or suggested by the combination of Kennedy and Ishikawa et al., claims 57-58, 61-70 and 78-82 are submitted to be unobvious over these references.

35 USC §103 Rejections Over Inaba and Ueda et al.

Amended independent claim 71 recites "a polymer member on the leadframe having a selected geometry configured to equalize the first volume and the second volume and to

reduce a package bow measured from a theoretical flat profile FP to less than about 3 mils." Antecedent basis for the "equalize" recitations is contained on page 15, lines 1-7 of the specification. Antecedent basis for the "flat profile" recitation is contained on page 14, lines 17-19 of the specification.

Inaba discloses a semiconductor device having thin plates 9 configured to reduce the region R where the thickness T1 and T2 of the sealing resin layer 6 are unbalanced. However, the plates 9 do not provide equal volumes of molding compound on either side of the leadframe, as presently claimed, because the regions R still exists. In other words Inaba teaches thickness equalization, rather than volume equalization as presently claimed. The Inaba plates prevent formation of "a winding void on the upper surface of the semiconductor element 1B as illustrated in Fig. 6" (column 3, lines 39-41). There is no suggestion of thermo-mechanical stress equalization in Inaba and the plates 9 do not inherently perform this function.

Ueda et al. was cited as teaching that "polymer is well known material in the art to form a plate member 1 (fig. 11B, column 1, lines 20-23)." However, the tape base material 1 in Ueda appears to be a conventional tape carrier (column 1, lines 19-20) like TAB tape. Such a polymer tape material would have a different structure and function than the presently claimed volume equalizing polymer members.


In view of these differences not taught or suggested by the combination of Inaba and Ueda et al., claims 71-73 and 76-77 are submitted to be unobvious over these references.

Conclusion

In view of the amendments and arguments, favorable consideration and allowance of claims 57-58 and 60-82 is respectfully requested. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

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